

## APPENDIX A

### MOON OBSERVATIONS

#### WHAT CAN YOU SEE? . . . WHAT PATTERNS CAN YOU FIND?

As you watch the Moon, these are some things you might observe. (Unless otherwise noted, directions are from the perspective of someone in the continental U. S. Some ideas (e.g., point 1) are true all around the Earth; but some ideas (e.g., point 5) need to be modified a little or a lot, depending on the location of the observer.

These ideas emphasize observation and patterns in observations. Interpretations of why the Moon does what it does are de-emphasized.

1. The Moon is not visible at all times, even when the sky is clear.
2. Sometimes the Moon can be seen during daylight hours; sometimes it can be seen when it's dark.
3. The Moon changes shape from day to day.

When you look at the Moon for two days in a row, you may not be able to see this change; but when you compare the Moon's shape for, say, 3-5 days, you can see that its shape changes.

The various Moon shapes are called phases. You can learn more about Moon phases at <http://www.EnchantedLearning.com/subjects/astronomy/moon/Phases.shtml>

4. The Moon has many shapes often called "phases."

The idea of "phases" is something invented by people to name a few of these basic shapes. For example, we refer to a "crescent Moon;" but sometimes the crescent is quite skinny and sometimes it's sort of fat and sometimes it's in between. The Moon has all of these shapes, but we tend to use one word, "crescent," to name this basic shape.

5. When the Moon is illuminated on the right side, as in these drawings, it is growing larger in size.

When referring to a side of the Moon (e.g., "right side"), I'm referring to the side relative to the observer on Earth.

If the drawings to the right are how the Moon appeared to you, you'd say it was illuminated on the right side.



- 6.



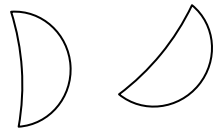
When the Moon is illuminated on the left side, as in the drawings to the left, it is growing smaller in size.

*Points 5 and 6 are true in the Northern hemisphere, but the reverse is true in the southern hemisphere.*

7. A Moon that is illuminated on the right side, which is growing in size from day to day (see point 5), is called a *waxing* Moon.

(Think about how candles are made. A wick is dipped into melted wax; and then the wax is allowed to dry. The candle is re-dipped into the melted wax and the new layer is allowed to dry. This process is repeated several times until the candle “grows” [waxes] to the desired size. In other words, this growing candle is waxing. And that’s why we call the growing Moon a *waxing* Moon.)

8. A waxing crescent Moon (i.e., a crescent Moon that is illuminated on the right side) can best be seen in the southwest to western<sup>1</sup> sky at dusk or shortly thereafter.
9. A first quarter moon (sometimes called a waxing half Moon),<sup>2</sup> that is illuminated on the right side can be seen around dusk in the southern sky. Later --- after sunset --- it can be seen in the southwest and then western sky.



Two weeks after the new, skinny waxing crescent Moon appears<sup>3</sup> in the western sky it has grown (waxed) to a full Moon.

10. The full Moon appears in the eastern sky at dusk; and as the night goes on, the full Moon moves to the southern sky and then to the western sky.<sup>4</sup>
11. The full Moon, which rose (appeared) in the eastern sky, sets the next morning in the western sky.
12. After the Moon is full it starts to shrink in size over the next few days.
13. The part of the shrinking Moon that is missing is on the right side of the Moon. (Thus, the part you can see is on the left, as in this drawing.<sup>5</sup>)
14. The Moon that is growing smaller (see point 6) is called a *waning* Moon.



15. You can tell right away by looking at the Moon whether it is waxing or waning.

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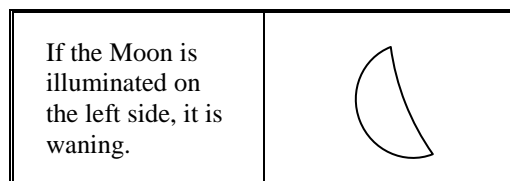
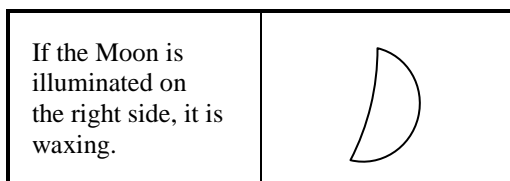
<sup>1</sup> Northwest to western sky in the southern hemisphere.

<sup>2</sup> When in the northern hemisphere the right half of the Moon is illuminated, astronomers call this a first quarter moon to indicate that the Moon is one quarter of the way through its cycle; and by the same logic, when the Moon is illuminated on the left in the northern hemisphere it is called a last quarter moon. I personally prefer the terms “waxing half moon” and “waning half moon,” since these terms describe its appearance, but I will defer to the experts.

<sup>3</sup> Be careful about the word appears. A new, skinny, waxing crescent Moon is up most of the daylight, but it's hard to see this skinny Moon before the Sun goes down, because the Sun is so bright.

<sup>4</sup> In the southern hemisphere the full Moon will be seen to move from east to west, but instead of moving from east to south to west, it will move from east to north to west.

<sup>5</sup> In the southern hemisphere the left side is missing and the right side of the waning Moon is visible.



16. The waning Moon rises later and later each night.
17. Both the Sun and Moon always rise in the east.
18. Both the Sun and Moon always set in the west.
19. A good time to view the Moon is when the Moon is full or close to full. Look for it in east as it is rising at dusk or shortly thereafter. The full Moon rises in the east as the Sun is setting in the west.
20. Other good times to see the Moon are in the evening in the West when the Moon is a new waxing Moon or in the morning in the west when it is a full Moon or close to a full Moon.
21. The side of the Moon that is illuminated is on the side facing the Sun.

When the Moon is full, you see all of its illuminated side. (Look for the full Moon at dusk. It will be in the east and the Sun will be in the west, so the Moon's illuminated side is facing the Sun.)

When the Moon is a waxing crescent, half of it is illuminated (as it always the case), but you can see only a sliver of the illuminated portion. We call that sliver a crescent.

Although the waxing crescent is visible in the sky for most of the daylight hours, the Sun is so bright that it's difficult to see the waxing crescent. The best time to see a waxing crescent is at dusk in the western sky after the Sun has set and the sky is getting a bit darker.

Think about where the Sun is in relationship to the Moon. They're close together. So the side of the Moon that is facing the Sun is the Moon's side that is facing away from us. Since the illuminated side is facing away, we can see only a portion of it. (If the illuminated side is entirely facing away, we cannot see any of it; and in our culture, we call that a "new Moon.")

22. The Moon doesn't stay in the same place.
23. From hour to hour the Moon moves toward the west.

This fact is easiest to observe when looking at a full Moon or close to a full Moon. The full Moon rises in the east and sets in the west. If you observe the Moon between these

two extremes, you'll see the Moon move from the east around to the south<sup>6</sup> and then to the southwest and then finally to the west.

24. From minute to minute the Moon moves toward the west.

This fact is easiest to observe when looking at the Moon over a 30-minute period when the Moon can be seen relative to a fixed object like a tree, flagpole or edge of a building.

25. This minute to minute movement (point 24) follows the same path as the hour to hour observations (point 23).

26. From day to day the Moon moves toward the east.

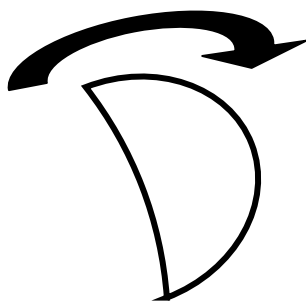
This fact is easiest to observe when watching the waxing Moon shortly after sundown. A waxing crescent shortly after sundown is seen in the west. A week later the first quarter moon (sometimes called a waxing half Moon) is seen shortly after sundown in the south.<sup>7</sup> And a week after that the full Moon is seen shortly after sundown in the east.

27. The waning Moon continues day to day to move toward the east and, thus, rises later and later each day; but it's more difficult to make these observations, since we tend to have gone to bed by the time the waning Moon rises. (However, night owls or those who wake up before sunrise can help verify these observations.)

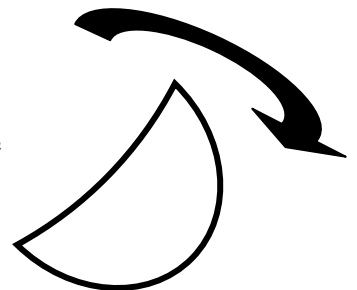
28. If you could poke a hole in the middle of the Moon, you would see that the Moon rotates in a clockwise direction as it moves across the sky.

This can be seen with a first quarter moon (sometimes called a waxing half Moon). When first seen in the late afternoon or evening, the straight edge of the waxing half Moon is on the left or bottom left of the Moon. Later on, as it moves toward the west, that straight edge moves (rotates) in a clockwise direction; and when this half Moon is close to setting, the straight edge is on the top left or top of the Moon.

Note that this is a tricky idea. Here we're talking about how the Moon appears to us and NOT about whether the Moon is actually rotating.



The Moon's orientation rotates clockwise  
in the northern hemisphere



<sup>6</sup> To the north in the southern hemisphere.

<sup>7</sup> In the north in the southern hemisphere.